

IHS Natural Gas Supply and Demand

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The California Connection

Implications of IHS CERA's "Rising to the Challenge" for California Gas Markets



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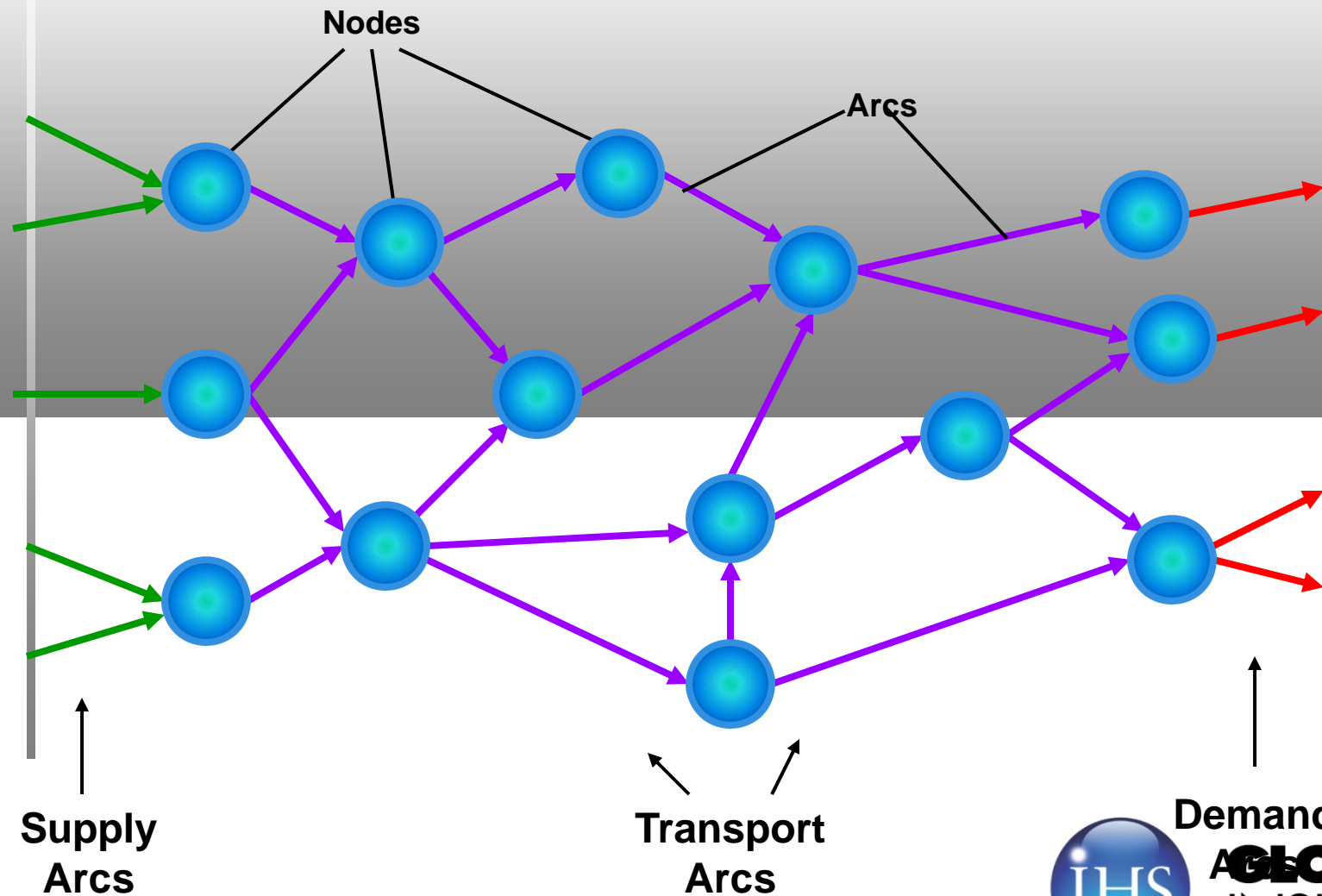
“Rising to The Challenge” – An IHS CERA Multi-Client study

- Led by Robert Ineson, Senior Director, North American Natural Gas, IHS CERA
- IHS Supply Capabilities
 - Used IHS well by well data representing over 1 million wells with data back to 1859
 - Production and Cost Analyzed for 121 plays
- IHS Integration
 - Production and Demand balanced within the GPCM model



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Figure 1: Structure of GPCM Network Model



Source: RBAC

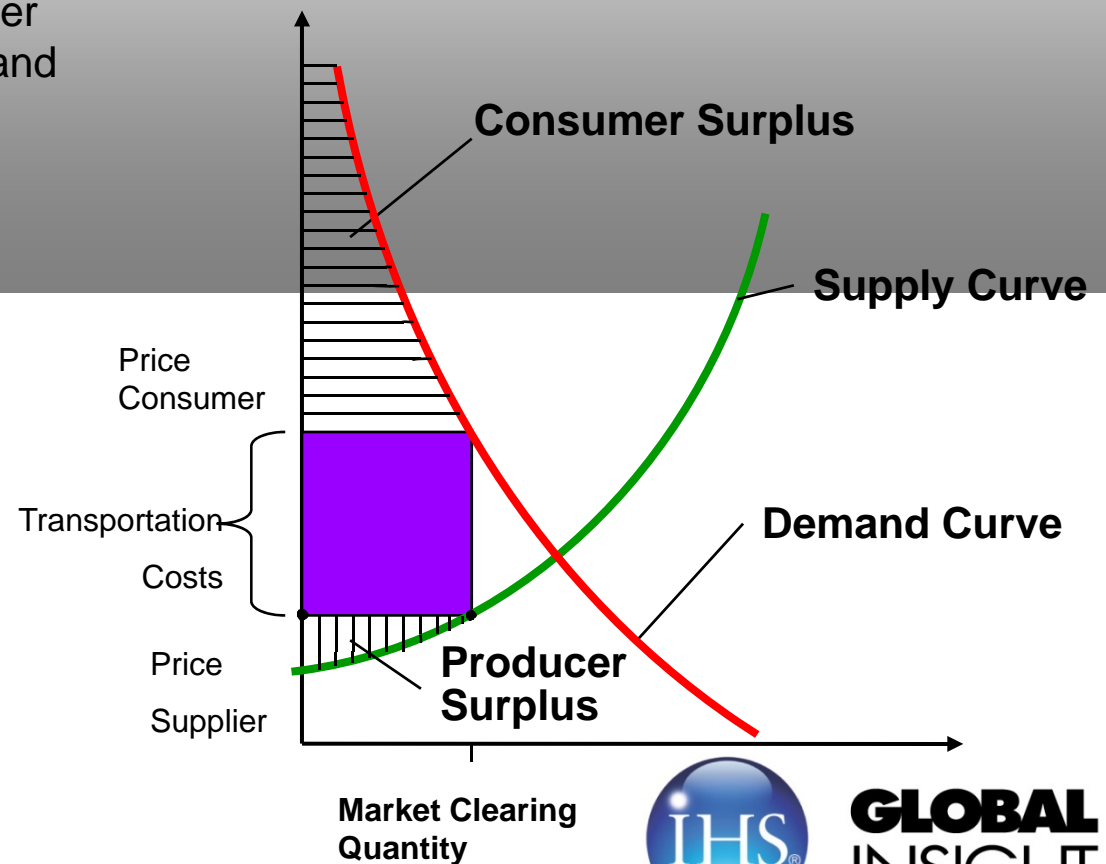


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Figure 2: GPCM Objective Function

Objective function:

maximize consumer & producer surplus minus transportation and storage costs.



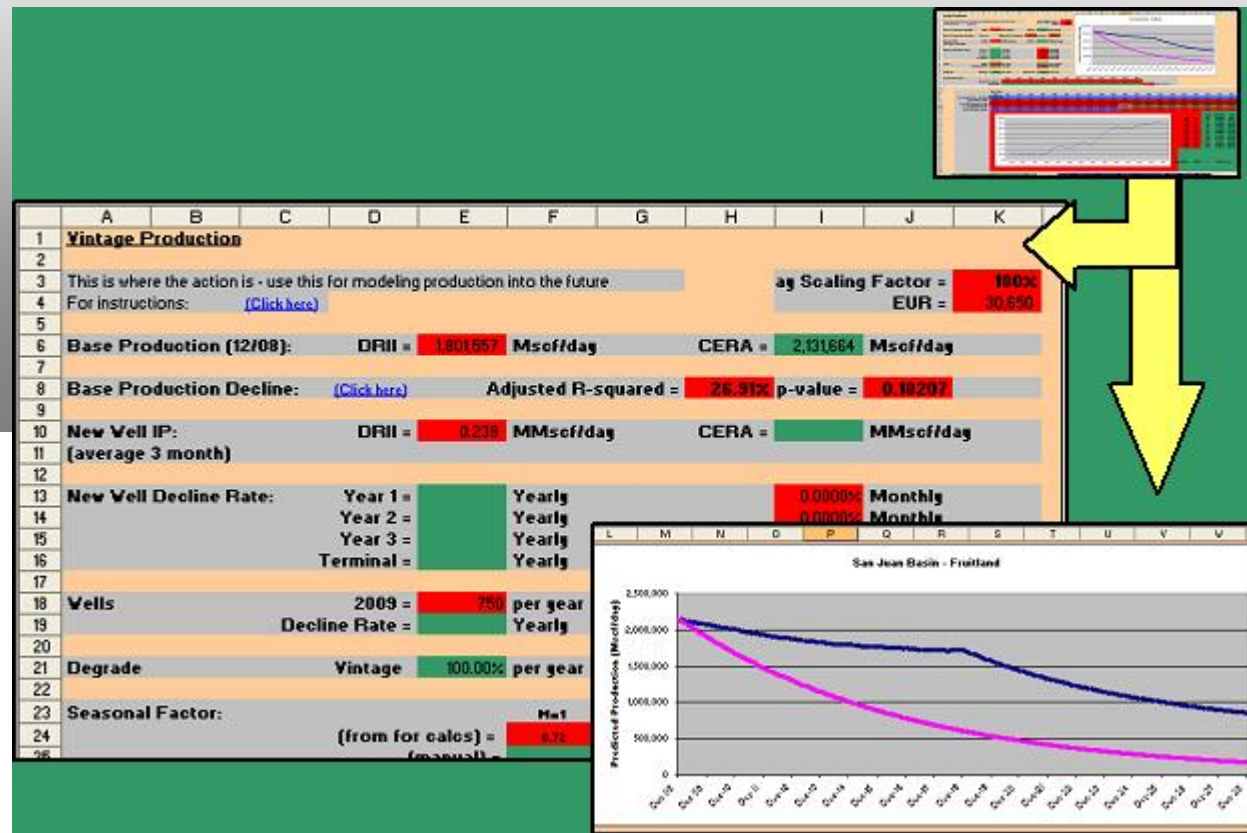
Source: RBAC



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Figure 4: Illustration of Play Level Parameters



Source: Cambridge Energy Research Associates.

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Figure 5: Illustration of Play to Region Consolidation

| | A | B | C | D | E | F | G | H |
|-----|---|---|---------------|------------------|-------------|-------------|-------------|-------------|
| 1 | | CERA Productive Capacity - Drg (MMscf/day) | | | | | | |
| 2 | | | | | | | | |
| 3 | | Total | Source | Shrinkage | 1995 | 1996 | 1997 | 1998 |
| 4 | | Total | IHS | 10.82% | 3,121 | 3,310 | 3,481 | 3,667 |
| 5 | | | | | 3,121 | 3,310 | 3,481 | 3,667 |
| 6 | | State | Source | Shrinkage | 1995 | 1996 | 1997 | 1998 |
| 7 | | Southern Colorado | IHS | NA | 967 | 1,041 | 1,098 | 1,159 |
| 8 | | Northwest New Mexico | IHS | NA | 2,154 | 2,269 | 2,384 | 2,508 |
| 9 | | | | | | | | |
| 10 | | Type of Production | Source | Shrinkage | 1995 | 1996 | 1997 | 1998 |
| 11 | | Associated Gas | IHS | 8.22% | 51 | 48 | 45 | 42 |
| 12 | | Conventional Gas | IHS | 11.60% | 1,069 | 1,102 | 1,158 | 1,216 |
| 13 | | Coal Bed Methane | IHS | 10.45% | 1,999 | 2,157 | 2,276 | 2,405 |
| 14 | | Unconventional | IHS | 8.18% | 2 | 3 | 3 | 4 |
| 15 | | | | | | | | |
| 16 | | Interesting Plays | Source | Shrinkage | 1995 | 1996 | 1997 | 1998 |
| 17 | | Pierre Shale | IHS | 0.00% | 0 | 0 | 0 | 0 |
| 18 | | Lewis/Mancos Shale | IHS | 8.02% | 2 | 3 | 3 | 4 |
| 19 | | | | | | | | |
| 20 | | CERA Productive Capacity - Drg - Type of Production (Mscf/day) | | | | | | |
| 21 | | | | | | | | |
| 22 | | Yearly | | Shrinkage | 1995 | 1996 | 1997 | 1998 |
| 23 | | Total Associated Gas | | 8.22% | 51 | 48 | 45 | 42 |
| 24 | | San Juan Basin | | 8.22% | 51 | 48 | 45 | 42 |
| 25 | | Total Conventional | | 11.60% | 1,069 | 1,102 | 1,158 | 1,216 |
| 26 | | San Juan Basin | | 11.60% | 1,069 | 1,102 | 1,158 | 1,216 |
| 27 | | Total Coal Bed Methane | | 10.45% | 1,999 | 2,157 | 2,276 | 2,405 |
| 28 | | San Juan Basin | | 10.45% | 1,999 | 2,157 | 2,276 | 2,405 |
| 29 | | Total Unconventional | | 8.18% | 2 | 3 | 3 | 4 |
| 30 | | San Juan Basin | | 8.18% | 2 | 3 | 3 | 4 |
| 31 | | | | | | | | |
| 32 | | Monthly | | Shrinkage | 1/95 | 2/95 | 3/95 | 4/95 |
| 33 | | Total Associated Gas | | 8.22% | 52 | 52 | 50 | 53 |
| 34 | | San Juan Basin | | 8.22% | 52 | 52 | 50 | 53 |
| 35 | | Total Conventional | | 11.60% | 1,090 | 1,092 | 1,072 | 1,077 |
| 36 | | San Juan Basin | | 11.60% | 1,090 | 1,092 | 1,072 | 1,077 |
| 37 | | Total Coal Bed Methane | | 10.45% | 1,963 | 1,993 | 1,999 | 1,996 |
| 38 | | San Juan Basin | | 10.45% | 1,963 | 1,993 | 1,999 | 1,996 |
| 39 | | Total Unconventional | | 8.18% | 2 | 2 | 2 | 2 |
| 40 | | San Juan Basin | | 8.18% | 2 | 2 | 2 | 2 |
| 41 | | | | | | | | |
| 42 | | CERA Productive Capacity - Drg - Play Level (Mscf/day) | | | | | | |
| 43 | | | | | | | | |
| 44 | | San Juan Basin | Type | Shrinkage | 1995 | 1996 | 1997 | 1998 |
| 45 | | Assoc Gas | Ass | 8.22% | 51 | 48 | 45 | 42 |
| 46 | | Conventional | Conv | 11.60% | 1,069 | 1,102 | 1,158 | 1,216 |
| 47 | | Coal Bed Methane | Conv | 10.45% | 1,999 | 2,157 | 2,276 | 2,405 |
| 48 | | Unconventional | Conv | 8.18% | 2 | 3 | 3 | 4 |
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Source: Cambridge Energy Research Associates.

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Figure 6: Reporting Capabilities

| A | B | C | D | E | F |
|----|---|---------------|------------------|------------------|-----------------|
| 1 | CERA Productive Capacity - Dry - (MMscf/day) | | | | |
| 2 | | | | | |
| 3 | Total | Source | Shrinkage | 2008 | 2009 |
| 4 | Total | RIIC | 10.32% | 3,441 | 3,437 |
| 5 | | ESSER | 0.00% | 3,644 | 3,616 |
| 6 | | Error | 0.00% | -6% | -5% |
| 7 | | | | 3,441 | 3,437 |
| 8 | State | Source | Shrinkage | 2008 | 2009 |
| 9 | Southern Colorado | RIIC | NA | 1,038 | 1,027 |
| 10 | | ESSER | 0.00% | 1,193 | 1,193 |
| 11 | | Error | 0.00% | -7% | -10% |
| 12 | Northwest New Mexico | RIIC | NA | 2,404 | 2,410 |
| 13 | | ESSER | 0.00% | 2,531 | 2,483 |
| 14 | | Error | 0.00% | -6% | -3% |
| 15 | | | | | |
| 16 | Type of Production | Source | Shrinkage | 2008 | 2009 |
| 17 | Associated Gas | RIIC | 8.22% | 32 | 29 |
| 18 | Conventional Gas | RIIC | 11.58% | 1,243 | 1,272 |
| 19 | Coal Bed Methane | RIIC | 10.45% | 2,132 | 2,105 |
| 20 | Unconventional | RIIC | 8.02% | 35 | 32 |
| 21 | | | | | |
| 22 | Interesting Plays | Source | Shrinkage | 2008 | 2009 |
| 23 | Pierre Shale | RIIC | 0.00% | 0 | 0 |
| 24 | Levis/Mancos Shale | RIIC | 8.26% | 35 | 32 |
| 25 | | | | | |
| 26 | CERA Productive Capacity - Dry - Type of Production (Mscf/day) | | | | |
| 27 | | | | | |
| 28 | Yearly | | Shrinkage | 2008 | 2009 |
| 29 | Total Associated Gas | | 8.22% | 32 | 29 |
| 30 | San Juan Basin | | 8.22% | 32 | 29 |
| 31 | Total Conventional | | 11.58% | 1,243 | 1,272 |
| 32 | San Juan Basin | | 11.58% | 1,243 | 1,272 |
| 33 | Total Coal Bed Methane | | 10.45% | 2,132 | 2,105 |
| 34 | San Juan Basin | | 10.45% | 2,132 | 2,105 |
| 35 | Total Unconventional | | 8.02% | 35 | 32 |
| 36 | San Juan Basin | | 8.02% | 35 | 32 |
| 37 | | | | | |
| 38 | Monthly | | Shrinkage | 12/1/2008 | 1/1/2009 |
| 39 | Total Associated Gas | | 8.22% | 32 | 32 |
| 40 | San Juan Basin | | 8.22% | 32 | 32 |
| 41 | Total Conventional | | 11.58% | 1,243 | 1,259 |
| 42 | San Juan Basin | | 11.58% | 1,243 | 1,259 |
| 43 | Total Coal Bed Methane | | 10.45% | 2,132 | 2,143 |
| 44 | San Juan Basin | | 10.45% | 2,132 | 2,143 |
| 45 | Total Unconventional | | 8.02% | 35 | 36 |
| 46 | San Juan Basin | | 8.02% | 35 | 36 |
| 47 | | | | | |

| APRIL 2014 - APRIL 2015 | | MAY 2014 - MAY 2015 | | JUNE 2014 - JUNE 2015 | | JULY 2014 - JULY 2015 | | AUGUST 2014 - AUGUST 2015 | | SEPTEMBER 2014 - SEPTEMBER 2015 | | OCTOBER 2014 - OCTOBER 2015 | | NOVEMBER 2014 - NOVEMBER 2015 | | DECEMBER 2014 - DECEMBER 2015 | | JANUARY 2015 - JANUARY 2016 | | FEBRUARY 2015 - FEBRUARY 2016 | | MARCH 2015 - MARCH 2016 | | APRIL 2015 - APRIL 2016 | | MAY 2015 - MAY 2016 | | JUNE 2015 - JUNE 2016 | | JULY 2015 - JULY 2016 | | AUGUST 2015 - AUGUST 2016 | | SEPTEMBER 2015 - SEPTEMBER 2016 | | OCTOBER 2015 - OCTOBER 2016 | | NOVEMBER 2015 - NOVEMBER 2016 | | DECEMBER 2015 - DECEMBER 2016 | | JANUARY 2016 - JANUARY 2017 | | FEBRUARY 2016 - FEBRUARY 2017 | | MARCH 2016 - MARCH 2017 | | APRIL 2016 - APRIL 2017 | | MAY 2016 - MAY 2017 | | JUNE 2016 - JUNE 2017 | | JULY 2016 - JULY 2017 | | AUGUST 2016 - AUGUST 2017 | | SEPTEMBER 2016 - SEPTEMBER 2017 | | OCTOBER 2016 - OCTOBER 2017 | | NOVEMBER 2016 - NOVEMBER 2017 | | DECEMBER 2016 - DECEMBER 2017 | | JANUARY 2017 - JANUARY 2018 | | FEBRUARY 2017 - FEBRUARY 2018 | | MARCH 2017 - MARCH 2018 | | APRIL 2017 - APRIL 2018 | | MAY 2017 - MAY 2018 | | JUNE 2017 - JUNE 2018 | | JULY 2017 - JULY 2018 | | AUGUST 2017 - AUGUST 2018 | | SEPTEMBER 2017 - SEPTEMBER 2018 | | OCTOBER 2017 - OCTOBER 2018 | | NOVEMBER 2017 - NOVEMBER 2018 | | DECEMBER 2017 - DECEMBER 2018 | | JANUARY 2018 - JANUARY 2019 | | FEBRUARY 2018 - FEBRUARY 2019 | | MARCH 2018 - MARCH 2019 | | APRIL 2018 - APRIL 2019 | | MAY 2018 - MAY 2019 | | JUNE 2018 - JUNE 2019 | | JULY 2018 - JULY 2019 | | AUGUST 2018 - AUGUST 2019 | | SEPTEMBER 2018 - SEPTEMBER 2019 | | OCTOBER 2018 - OCTOBER 2019 | | NOVEMBER 2018 - NOVEMBER 2019 | | DECEMBER 2018 - DECEMBER 2019 | | JANUARY 2019 - JANUARY 2020 | | FEBRUARY 2019 - FEBRUARY 2020 | | MARCH 2019 - MARCH 2020 | | APRIL 2019 - APRIL 2020 | | MAY 2019 - MAY 2020 | | JUNE 2019 - JUNE 2020 | | JULY 2019 - JULY 2020 | | AUGUST 2019 - AUGUST 2020 | | SEPTEMBER 2019 - SEPTEMBER 2020 | | OCTOBER 2019 - OCTOBER 2020 | | NOVEMBER 2019 - NOVEMBER 2020 | | DECEMBER 2019 - DECEMBER 2020 | | JANUARY 2020 - JANUARY 2021 | | FEBRUARY 2020 - FEBRUARY 2021 | | MARCH 2020 - MARCH 2021 | | APRIL 2020 - APRIL 2021 | | MAY 2020 - MAY 2021 | | JUNE 2020 - JUNE 2021 | | JULY 2020 - JULY 2021 | | AUGUST 2020 - AUGUST 2021 | | SEPTEMBER 2020 - SEPTEMBER 2021 | | OCTOBER 2020 - OCTOBER 2021 | | NOVEMBER 2020 - NOVEMBER 2021 | | DECEMBER 2020 - DECEMBER 2021 | | JANUARY 2021 - JANUARY 2022 | | FEBRUARY 2021 - FEBRUARY 2022 | | MARCH 2021 - MARCH 2022 | | APRIL 2021 - APRIL 2022 | | MAY 2021 - MAY 2022 | | JUNE 2021 - JUNE 2022 | | JULY 2021 - JULY 2022 | | AUGUST 2021 - AUGUST 2022 | | SEPTEMBER 2021 - SEPTEMBER 2022 | | OCTOBER 2021 - OCTOBER 2022 | | NOVEMBER 2021 - NOVEMBER 2022 | | DECEMBER 2021 - DECEMBER 2022 | | JANUARY 2022 - JANUARY 2023 | | FEBRUARY 2022 - FEBRUARY 2023 | | MARCH 2022 - MARCH 2023 | | APRIL 2022 - APRIL 2023 | | MAY 2022 - MAY 2023 | | JUNE 2022 - JUNE 2023 | | JULY 2022 - JULY 2023 | | AUGUST 2022 - AUGUST 2023 | | SEPTEMBER 2022 - SEPTEMBER 2023 | | OCTOBER 2022 - OCTOBER 2023 | | NOVEMBER 2022 - NOVEMBER 2023 | | DECEMBER 2022 - DECEMBER 2023 | | JANUARY 2023 - JANUARY 2024 | | FEBRUARY 2023 - FEBRUARY 2024 | | MARCH 2023 - MARCH 2024 | | APRIL 2023 - APRIL 2024 | | MAY 2023 - MAY 2024 | | JUNE 2023 - JUNE 2024 | | JULY 2023 - JULY 2024 | | AUGUST 2023 - AUGUST 2024 | | SEPTEMBER 2023 - SEPTEMBER 2024 | | OCTOBER 2023 - OCTOBER 2024 | | NOVEMBER 2023 - NOVEMBER 2024 | | DECEMBER 2023 - DECEMBER 2024 | | JANUARY 2024 - JANUARY 2025 | | FEBRUARY 2024 - FEBRUARY 2025 | | MARCH 2024 - MARCH 2025 | | APRIL 2024 - APRIL 2025 | | MAY 2024 - MAY 2025 | | JUNE 2024 - JUNE 2025 | | JULY 2024 - JULY 2025 | | AUGUST 2024 - AUGUST 2025 | | SEPTEMBER 2024 - SEPTEMBER 2025 | | OCTOBER 2024 - OCTOBER 2025 | | NOVEMBER 2024 - NOVEMBER 2025 | | DECEMBER 2024 - DECEMBER 2025 | | JANUARY 2025 - JANUARY 2026 | | FEBRUARY 2025 - FEBRUARY 2026 | | MARCH 2025 - MARCH 2026 | | APRIL 2025 - APRIL 2026 | | MAY 2025 - MAY 2026 | | JUNE 2025 - JUNE 2026 | | JULY 2025 - JULY 2026 | | AUGUST 2025 - AUGUST 2026 | | SEPTEMBER 2025 - SEPTEMBER 2026 | | OCTOBER 2025 - OCTOBER 2026 | | NOVEMBER 2025 - NOVEMBER 2026 | | DECEMBER 2025 - DECEMBER 2026 | | JANUARY 2026 - JANUARY 2027 | | FEBRUARY 2026 - FEBRUARY 2027 | | MARCH 2026 - MARCH 2027 | | APRIL 2026 - APRIL 2027 | | MAY 2026 - MAY 2027 | | JUNE 2026 - JUNE 2027 | | JULY 2026 - JULY 2027 | | AUGUST 2026 - AUGUST 2027 | | SEPTEMBER 2026 - SEPTEMBER 2027 | | OCTOBER 2026 - OCTOBER 2027 | | NOVEMBER 2026 - NOVEMBER 2027 | | DECEMBER 2026 - DECEMBER 2027 | | JANUARY 2027 - JANUARY 2028 | | FEBRUARY 2027 - FEBRUARY 2028 | | MARCH 2027 - MARCH 2028 | | APRIL 2027 - APRIL 2028 | | MAY 2027 - MAY 2028 | | JUNE 2027 - JUNE 2028 | | JULY 2027 - JULY 2028 | | AUGUST 2027 - AUGUST 2028 | | SEPTEMBER 2027 - SEPTEMBER 2028 | | OCTOBER 2027 - OCTOBER 2028 | | NOVEMBER 2027 - NOVEMBER 2028 | | DECEMBER 2027 - DECEMBER 2028 | | JANUARY 2028 - JANUARY 2029 | | FEBRUARY 2028 - FEBRUARY 2029 | | MARCH 2028 - MARCH 2029 | | APRIL 2028 - APRIL 2029 | | MAY 2028 - MAY 2029 | | JUNE 2028 - JUNE 2029 | | JULY 2028 - JULY 2029 | | AUGUST 2028 - AUGUST 2029 | | SEPTEMBER 2028 - SEPTEMBER 2029 | | OCTOBER 2028 - OCTOBER 2029 | | NOVEMBER 2028 - NOVEMBER 2029 | | DECEMBER 2028 - DECEMBER 2029 | | JANUARY 2029 - JANUARY 2030 | | FEBRUARY 2029 - FEBRUARY 2030 | | MARCH 2029 - MARCH 2030 | | APRIL 2029 - APRIL 2030 | | MAY 2029 - MAY 2030 | | JUNE 2029 - JUNE 2030 | | JULY 2029 - JULY 2030 | | AUGUST 2029 - AUGUST 2030 | | SEPTEMBER 2029 - SEPTEMBER 2030 | | OCTOBER 2029 - OCTOBER 2030 | | NOVEMBER 2029 - NOVEMBER 2030 | | DECEMBER 2029 - DECEMBER 2030 | | JANUARY 2030 - JANUARY 2031 | | FEBRUARY 2030 - FEBRUARY 2031 | | MARCH 2030 - MARCH 2031 | | APRIL 2030 - APRIL 2031 | | MAY 2030 - MAY 2031 | | JUNE 2030 - JUNE 2031 | | JULY 2030 - JULY 2031 | | AUGUST 2030 - AUGUST 2031 | | SEPTEMBER 2030 - SEPTEMBER 2031 | | OCTOBER 2030 - OCTOBER 2031 | | NOVEMBER 2030 - NOVEMBER 2031 | | DECEMBER 2030 - DECEMBER 2031 | | JANUARY 2031 - JANUARY 2032 | | FEBRUARY 2031 - FEBRUARY 2032 | | MARCH 2031 - MARCH 2032 | | APRIL 2031 - APRIL 2032 | | MAY 2031 - MAY 2032 | | JUNE 2031 - JUNE 2032 | | JULY 2031 - JULY 2032 | | AUGUST 2031 - AUGUST 2032 | | SEPTEMBER 2031 - SEPTEMBER 2032 | | OCTOBER 2031 - OCTOBER 2032 | | NOVEMBER 2031 - NOVEMBER 2032 | | DECEMBER 2031 - DECEMBER 2032 | | JANUARY 2032 - JANUARY 2033 | | FEBRUARY 2032 - FEBRUARY 2033 | | MARCH 2032 - MARCH 2033 | | APRIL 2032 - APRIL 2033 | | MAY 2032 - MAY 2033 | | JUNE 2032 - JUNE 2033 | | JULY 2032 - JULY 2033 | | AUGUST 2032 - AUGUST 2033 | | SEPTEMBER 2032 - SEPTEMBER 2033 | | OCTOBER 2032 - OCTOBER 2033 | | NOVEMBER 2032 - NOVEMBER 2033 | | DECEMBER 2032 - DECEMBER 2033 | | JANUARY 2033 - JANUARY 2034 | | FEBRUARY 2033 - FEBRUARY 2034 | | MARCH 2033 - MARCH 2034 | | APRIL 2033 - APRIL 2034 | | MAY 2033 - MAY 2034 | | JUNE 2033 - JUNE 2034 | | JULY 2033 - JULY 2034 | | AUGUST 2033 - AUGUST 2034 | | SEPTEMBER 2033 - SEPTEMBER 2034 | | OCTOBER 2033 - OCTOBER 2034 | | NOVEMBER 2033 - NOVEMBER 2034 | | DECEMBER 2033 - DECEMBER 2034 | | JANUARY 2034 - JANUARY 2035 | | FEBRUARY 2034 - FEBRUARY 2035 | | MARCH 2034 - MARCH 2035 | | APRIL 2034 - APRIL 2035 | | MAY 2034 - MAY 2035 | | JUNE 2034 - JUNE 2035 | | JULY 2034 - JULY 2035 | | AUGUST 2034 - AUGUST 2035 | | SEPTEMBER 2034 - SEPTEMBER 2035 | | OCTOBER 2034 - OCTOBER 2035 | | NOVEMBER 2034 - NOVEMBER 2035 | | DECEMBER 2034 - DECEMBER 2035 | | JANUARY 2035 - JANUARY 2036 | | FEBRUARY 2035 - FEBRUARY 2036 | | MARCH 2035 - MARCH 2036 | | APRIL 2035 - APRIL 2036 | | MAY 2035 - MAY 2036 | | JUNE 2035 - JUNE 2036 | | JULY 2035 - JULY 2036 | | AUGUST 2035 - AUGUST 2036 | | SEPTEMBER 2035 - SEPTEMBER 2036 | | OCTOBER 2035 - OCTOBER 2036 | | NOVEMBER 2035 - NOVEMBER 2036 | | DECEMBER 2035 - DECEMBER 2036 | | JANUARY 2036 - JANUARY 2037 | | FEBRUARY 2036 - FEBRUARY 2037 | | MARCH 2036 - MARCH 2037 | | APRIL 2036 - APRIL 2037 | | MAY 2036 - MAY 2037 | | JUNE 2036 - JUNE 2037 | | JULY 2036 - JULY 2037 | | AUGUST 2036 - AUGUST 2037 | | SEPTEMBER 2036 - SEPTEMBER 2037 | | OCTOBER 2036 - OCTOBER 2037 | | NOVEMBER 2036 - NOVEMBER 2037 | | DECEMBER 2036 - DECEMBER 2037 | | JANUARY 2037 - JANUARY 2038 | | FEBRUARY 2037 - FEBRUARY 2038 | | MARCH 2037 - MARCH 2038 | | APRIL 2037 - APRIL 2038 | | MAY 2037 - MAY 2038 | | JUNE 2037 - JUNE 2038 | | JULY 2037 - JULY 2038 | | AUGUST 2037 - AUGUST 2038 | | SEPTEMBER 2037 - SEPTEMBER 2038 | | OCTOBER 2037 - OCTOBER 2038 | | NOVEMBER 2037 - NOVEMBER 2038 | | DECEMBER 2037 - DECEMBER 2038 | | JANUARY 2038 - JANUARY 2039 | | FEBRUARY 2038 - FEBRUARY 2039 | | MARCH 2038 - MARCH 2039 | | APRIL 2038 - APRIL 2039 | | MAY 2038 - MAY 2039 | | JUNE 2038 - JUNE 2039 | | JULY 2038 - JULY 2039 | | AUGUST 2038 - AUGUST 2039 | | SEPTEMBER 2038 - SEPTEMBER 2039 | | OCTOBER 2038 - OCTOBER 2039 | | NOVEMBER 2038 - NOVEMBER 2039 | | DECEMBER 2038 - DECEMBER 2039 | | JANUARY 2039 - JANUARY 2040 | | FEBRUARY 2039 - FEBRUARY 2040 | | MARCH 2039 - MARCH 2040 | | APRIL 2039 - APRIL 2040 | | MAY 2039 - MAY 2040 | | JUNE 2039 - JUNE 2040 | | JULY 2039 - JULY 2040 | | AUGUST 2039 - AUGUST 2040 | | SEPTEMBER 2039 - SEPTEMBER 2040 | | OCTOBER 2039 - OCTOBER 2040 | | NOVEMBER 2039 - NOVEMBER 2040 | | DECEMBER 2039 - DECEMBER 2040 | | JANUARY 2040 - JANUARY 2041 | | FEBRUARY 2040 - FEBRUARY 2041 | | MARCH 2040 - MARCH 2041 | | APRIL 2040 - APRIL 2041 | | MAY 2040 - MAY 2041 | | JUNE 2040 - JUNE 2041 | | JULY 2040 - JULY 2041 | | AUGUST 2040 - AUGUST 2041 | | SEPTEMBER 2040 - SEPTEMBER 2041 | | OCTOBER 2040 - OCTOBER 2041 | | NOVEMBER 2040 - NOVEMBER 2041 | | DECEMBER 2040 - DECEMBER 2041 | | JANUARY 2041 - JANUARY 2042 | | FEBRUARY 2041 - FEBRUARY 2042 | | MARCH 2041 - MARCH 2042 | | APRIL 2041 - APRIL 2042 | | MAY 2041 - MAY 2042 | | JUNE 2041 - JUNE 2042 | | JULY 2041 - JULY 2042 | | AUGUST 2041 - AUGUST 2042 | | SEPTEMBER 2041 - SEPTEMBER 2042 | | OCTOBER 2041 - OCTOBER 2042 | | NOVEMBER 2041 - NOVEMBER 2042 | | DECEMBER 2041 - DECEMBER 2042 | | JANUARY 2042 - JANUARY 2043 | | FEBRUARY 2042 - FEBRUARY 2043 | | MARCH 2042 - MARCH 2043 | | APRIL 2042 - APRIL 2043 | | MAY 2042 - MAY 2043 | | JUNE 2042 - JUNE 2043 | | JULY 2042 - JULY 2043 | | AUGUST 2042 - AUGUST 2043 | | SEPTEMBER 2042 - SEPTEMBER 2043 | | OCTOBER 2042 - OCTOBER 2043 | | NOVEMBER 2042 - NOVEMBER 2043 | | DECEMBER 2042 - DECEMBER 2043 | | JANUARY 2043 - JANUARY 2044 | | FEBRUARY 2043 - FEBRUARY 2044 | | MARCH 2043 - MARCH 2044 | | APRIL 2043 - APRIL 2044 | | MAY 2043 - MAY 2044 | | JUNE 2043 - JUNE 2044 | | JULY 2043 - JULY 2044 | | AUGUST 2043 - AUGUST 2044 | | SEPTEMBER 2043 - SEPTEMBER 2044 | | OCTOBER 2043 - OCTOBER 2044 | | NOVEMBER 2043 - NOVEMBER 2044 | | DECEMBER 2043 - DECEMBER 2044 | | JANUARY 2044 - JANUARY 2045 | | FEBRUARY 2044 - FEBRUARY 2045 | | MARCH 2044 - MARCH 2045 | | APRIL 2044 - APRIL 2045 | | MAY 2044 - MAY 2045 | | JUNE 2044 - JUNE 2045 | | JULY 2044 - JULY 2045 | | AUGUST 2044 - AUGUST 2045 | | SEPTEMBER 2044 - SEPTEMBER 2045 | | OCTOBER 2044 - OCTOBER 2045 | | NOVEMBER 2044 - NOVEMBER 2045 | | DECEMBER 2044 - DECEMBER 2045 | | JANUARY 2045 - JANUARY 2046 | | FEBRUARY 2045 - FEBRUARY 2046 | | MARCH 2045 - MARCH 2046 | | APRIL 2045 - APRIL 2046 | | MAY 2045 - MAY 2046 | | JUNE 2045 - JUNE 2046 | | JULY 2045 - JULY 2046 | | AUGUST 2045 - AUGUST 2046 | | SEPTEMBER 2045 - SEPTEMBER 2046 | | OCTOBER 2045 - OCTOBER 2046 | | NOVEMBER 2045 - NOVEMBER 2046 | | DECEMBER 2045 - DECEMBER 2046 | | JANUARY 2046 - JANUARY 2047 | | FEBRUARY 2046 - FEBRUARY 2047 | | MARCH 2046 - MARCH 2047 | | APRIL 2046 - APRIL 2047 | | MAY 2046 - MAY 2047 | | JUNE 2046 - JUNE 2047 | | JULY 2046 - JULY 2047 | | AUGUST 2046 - AUGUST 2047 | | SEPTEMBER 2046 - SEPTEMBER 2047 | | OCTOBER 2046 - OCTOBER 2047 | | NOVEMBER 2046 - NOVEMBER 2047 | | DECEMBER 2046 - DECEMBER 2047 | | JANUARY 2047 - JANUARY 2048 | | FEBRUARY 2047 - FEBRUARY 2048 | | MARCH 2047 - MARCH 2048 | | APRIL 2047 - APRIL 2048 | | MAY 2047 - MAY 2048 | | JUNE 2047 - JUNE 2048 | | JULY 2047 - JULY 2048 | | AUGUST 2047 - AUGUST 2048 | | SEPTEMBER 2047 - SEPTEMBER 2048 | | OCTOBER 2047 - OCTOBER 2048 | | NOVEMBER 2047 - NOVEMBER 2048 | | DECEMBER 2047 - DECEMBER 2048 | | JANUARY 2048 - JANUARY 2049 | | FEBRUARY 2048 - FEBRUARY 2049 | | MARCH 2048 - MARCH 2049 | | APRIL 2048 - APRIL 2049 | | MAY 2048 - MAY 2049 | | JUNE 2048 - JUNE 2049 | | JULY 2048 - JULY 2049 | | AUGUST 2048 - AUGUST 2049 | | SEPTEMBER 2048 - SEPTEMBER 2049 | | OCTOBER 2048 - OCTOBER 2049 | | NOVEMBER 2048 - NOVEMBER 2049 | | DECEMBER 2048 - DECEMBER 2049 | | JANUARY 2049 - JANUARY 2050 | | FEBRUARY 2049 - FEBRUARY 2050 | | MARCH 2049 - MARCH 2050 | | APRIL 2049 - APRIL 2050 | | MAY 2049 - MAY 2050 | | JUNE 2049 - JUNE 2050 | | JULY 2049 - JULY 2050 | | AUGUST 2049 - AUGUST 2050 | | SEPTEMBER 2049 - SEPTEMBER 2050 | | OCTOBER 2049 - OCTOBER 2050 | | NOVEMBER 2049 - NOVEMBER 2050 | | DECEMBER 2049 - DECEMBER 2050 | | JANUARY 2050 - JANUARY 2051 | | FEBRUARY 2050 - FEBRUARY 2051 | | MARCH 2050 - MARCH 2051 | | APRIL 2050 - APRIL 2051 | | MAY 2050 - MAY 2051 | | JUNE 2050 - JUNE 2051 | | JULY 2050 - JULY 2051 | | AUGUST 2050 - AUGUST 2051 | | SEPTEMBER 2050 - SEPTEMBER 2051 | | OCTOBER 2050 - OCTOBER 2051 | | NOVEMBER 2050 - NOVEMBER 2051 | | DECEMBER 2050 - DECEMBER 2051 | | JANUARY 2051 - JANUARY 2052 | | FEBRUARY 2051 - FEBRUARY 2052 | | MARCH 2051 - MARCH 2052 | | APRIL 2051 - APRIL 2052 | | MAY 2051 - MAY 2052 | | JUNE 2051 - JUNE 2052 | | JULY 2051 - JULY 2052 | | AUGUST 2051 - AUGUST 2052 | | SEPTEMBER 2051 - SEPTEMBER 2052 | | OCTOBER 2051 - OCTOBER 2052 | | NOVEMBER 2051 - NOVEMBER 2052 | | DECEMBER 2051 - DECEMBER 2052 | | JANUARY 2052 - JANUARY 2053 | | FEBRUARY 2052 - FEBRUARY 2053 | | MARCH 2052 - MARCH 2053 | | APRIL 2052 - APRIL 2053 | | MAY 2052 - MAY 2053 | | JUNE 2052 - JUNE 2053 | | JULY 2052 - JULY 2053 | | AUGUST 2052 - AUGUST 2053 | | SEPTEMBER 2052 - SEPTEMBER 2053 | | OCTOBER 2052 - OCTOBER 2053 | | NOVEMBER 2052 - NOVEMBER 2053 | | DECEMBER 2052 - DECEMBER 2053 | | JANUARY 2053 - JANUARY 2054 | | FEBRUARY 2053 - FEBRUARY 2054 | | MARCH 2053 - MARCH 2054 | | APRIL 2053 - APRIL 2054 | | MAY 2053 - MAY 2054 | | JUNE 2053 - JUNE 2054 | | JULY 2053 - JULY 2054 | | AUGUST 2053 - AUGUST 2054 | | SEPTEMBER 2053 - SEPTEMBER 2054 | | OCTOBER 2053 - OCTOBER 2054 | | NOVEMBER 2053 - NOVEMBER 2054 | | DECEMBER 2053 - DECEMBER 2054 | | JANUARY 2054 - JANUARY 2055 | | FEBRUARY 2054 - FEBRUARY 2055 | | MARCH 2054 - MARCH 2055 | | APRIL 2054 - APRIL 2055 | | MAY 2054 - MAY 2055 | | JUNE 2054 - JUNE 2055 | | JULY 2054 - JULY 2055 | | AUGUST 2054 - AUGUST 2055 | | SEPTEMBER 2054 - SEPTEMBER 2055 | | OCTOBER 2054 - OCTOBER 2055 | | NOVEMBER 2054 - NOVEMBER 2055 | | DECEMBER 2054 - DECEMBER 2055 | | JANUARY 2055 - JANUARY 2056 | | FEBRUARY 2055 - FEBRUARY 2056 | | MARCH 2055 - MARCH 2056 | | APRIL 2055 - APRIL 2056 | | MAY 2055 - MAY 2056 | | JUNE 2055 - JUNE 2056 | | JULY 2055 - JULY 2056 | | AUGUST 2055 - AUGUST 2056 | | SEPTEMBER 2055 - SEPTEMBER 2056 | | OCTOBER 2055 - OCTOBER 2056 | | NOVEMBER 2055 - NOVEMBER 2056 | | DECEMBER 2055 - DECEMBER 2056 | | JANUARY 2056 - JANUARY 2057 | | FEBRUARY 2056 - FEBRUARY 2057 | | MARCH 2056 - MARCH 2057 | | APRIL 2056 - APRIL 2057 | | MAY 2056 - MAY 2057 | | JUNE 2056 - JUNE 2057 | | JULY 2056 - JULY 2057 | | AUGUST 2056 - AUGUST 2057 | |
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Figure 7: Access Database

| Basin | State | Play | Type of Reservoir | Drilling Month | Production Month | Productive Capacity | IP Rate (Mscf/d) | Wells Drilled | New Well Production |
|----------|------------|----------------|-------------------|----------------|------------------|---------------------|------------------|---------------|---------------------|
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 10/1/2023 | 703 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 11/1/2023 | 699 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 12/1/2023 | 696 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 1/1/2024 | 692 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 2/1/2024 | 689 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 3/1/2024 | 685 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 4/1/2024 | 682 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 5/1/2024 | 678 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 6/1/2024 | 675 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 7/1/2024 | 671 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 8/1/2024 | 668 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 9/1/2024 | 665 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 10/1/2024 | 662 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 11/1/2024 | 658 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 12/1/2024 | 655 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 1/1/2025 | 652 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 2/1/2025 | 649 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 3/1/2025 | 646 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 4/1/2025 | 643 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 5/1/2025 | 640 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 6/1/2025 | 637 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 7/1/2025 | 634 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 8/1/2025 | 631 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 9/1/2025 | 628 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 10/1/2025 | 625 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 11/1/2025 | 622 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 12/1/2025 | 620 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 1/1/2026 | 617 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 2/1/2026 | 614 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 3/1/2026 | 612 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 4/1/2026 | 609 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 5/1/2026 | 606 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 6/1/2026 | 604 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 7/1/2026 | 601 | 9 | 6 | |
| San Juan | New Mexico | Picture Cliffs | Conventional | 10/1/2018 | 8/1/2026 | 598 | 9 | 6 | |

Source: Cambridge Energy Research Associates.

####



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Rising to The Challenge – An IHS CERA Multi-Client study

- California faces diversion of natural gas supplies to premium East Coast regions
 - Exacerbated by the decline in Canadian exports
 - The Rex East pipeline
 - Southeast demand growth

Source: Cambridge Energy Research Associates



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California Supply Risks: “Rising to The Challenge” – An IHS CERA Multi-Client study

- **Most Supply growth west of the Mississippi but with most Demand growth east of the Mississippi – supply is diverted away from California**
 - **Demand centers on Coast, supply centers shifting from Gulf to inland shale plays**
 - **West to East flows cover shorter distances as shale expands versus prior expectation that Rockies would lead production growth**
 - **Key producing areas compete for market share in consuming regions – a portion east and a portion west**

Source: Cambridge Energy Research Associates



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California Supply Risks: “Rising to The Challenge” – An IHS CERA Multi-Client study

- **Rocky Mountains Looking to the East**
 - Demand centers with premium prices are on East Coast
 - Rex East replaces declining Canadian exports with Rocky Mountain gas
 - Include Ruby pipeline (Opal to Malin) and a small expansion of Kern River (Opal to Bakersfield)
 - Rockies gas flows eastward to the extent of pipeline capacity with the residual supply serving the west
- **Canadian Supply Declining**
 - Canadian production falling while demand rises restricting exports but West Coast holds 2 to 3 bcf/day of supply – higher in summer
 - Net exports fall to 6.1 bcf/day in 2010

Source: Cambridge Energy Research Associates

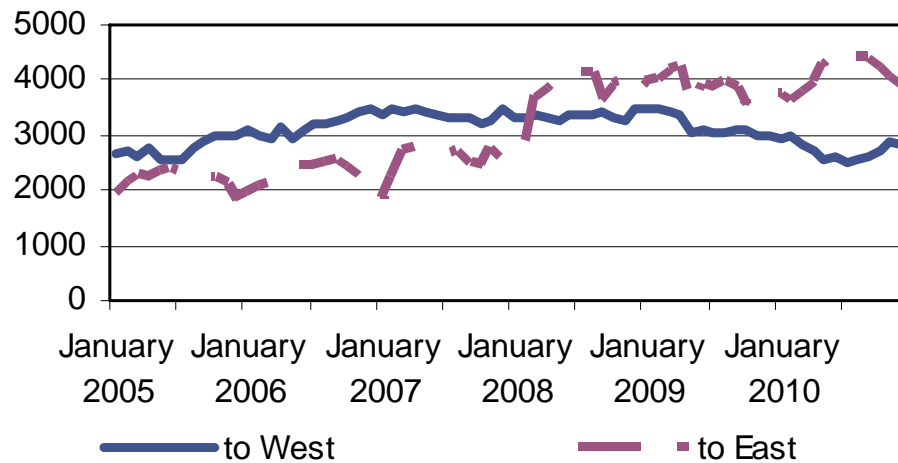


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California Gas Flows Changing

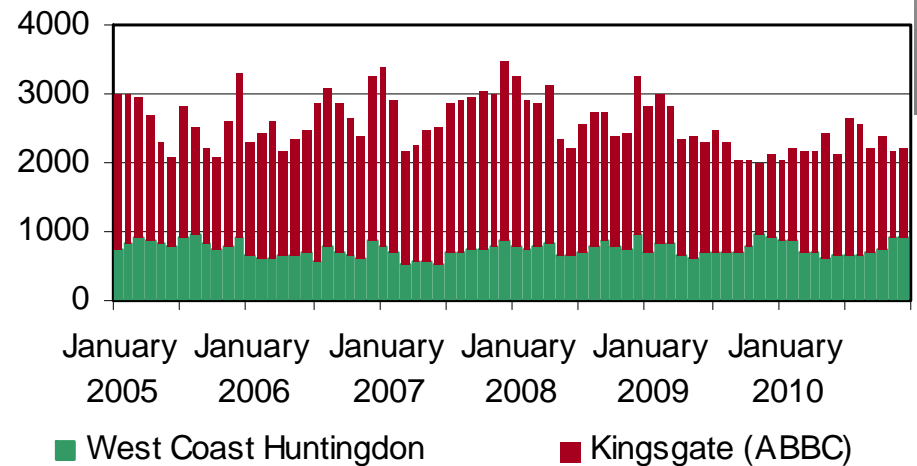
Rocky Mountain Gas Going East

(Million cubic feet per day)



Canadian Gas Flows Declining

(Million cubic feet per day)



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California Supply Risks: “Rising to The Challenge” – An IHS CERA Multi-Client study

- **Mid continent supplies flow to Midwest**
 - Layout of pipeline grid – ANR, NGPL, Panhandle, Northern Natural
 - Shale plays – Woodford, Fayetteville, Barnett – adding pipeline capacity focused upon the growing markets of the southeast
- **Southern States – Texas, Oklahoma, Louisiana – keep Gulf Coast gas at home**
 - Demand of 25 bcf/day, Gulf Coast Supply of 15 bcf/day
 - Northbound flow from southern states about 12 bcf/day but will not grow
- **LNG imports grow slowly**
 - Concentrated in east coast terminals
 - Smaller, Opportunistic summer sales to Gulf Coast

Source: Cambridge Energy Research Associates



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The Economic Outlook

IHS Global Insight – World's Leading Economic Forecaster



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The Worst Global Recession in the Postwar Era

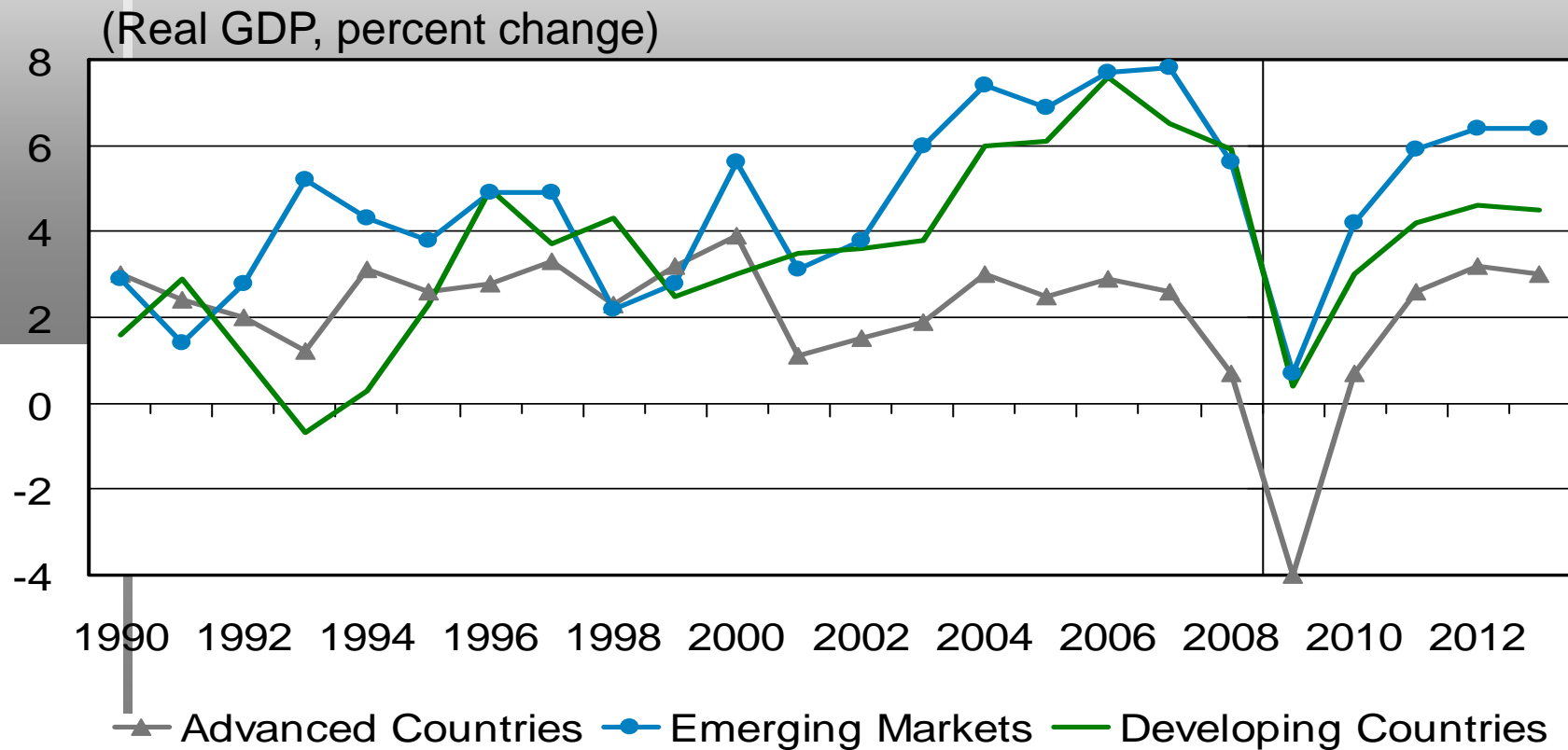
- The worldwide scope of this financial crisis is unprecedented
- Globalization of trade and capital flows has increased business cycle synchronization and volatility
- Monetary and fiscal stimuli will help to revive growth
- The world economy's precipitous decline will soon abate
- But a broad recovery is a year away
- Bottom Line: a deep recession in 2009, modest recovery in 2010, and a stronger rebound in 2011-12



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It's Still a Two-Speed World Economy

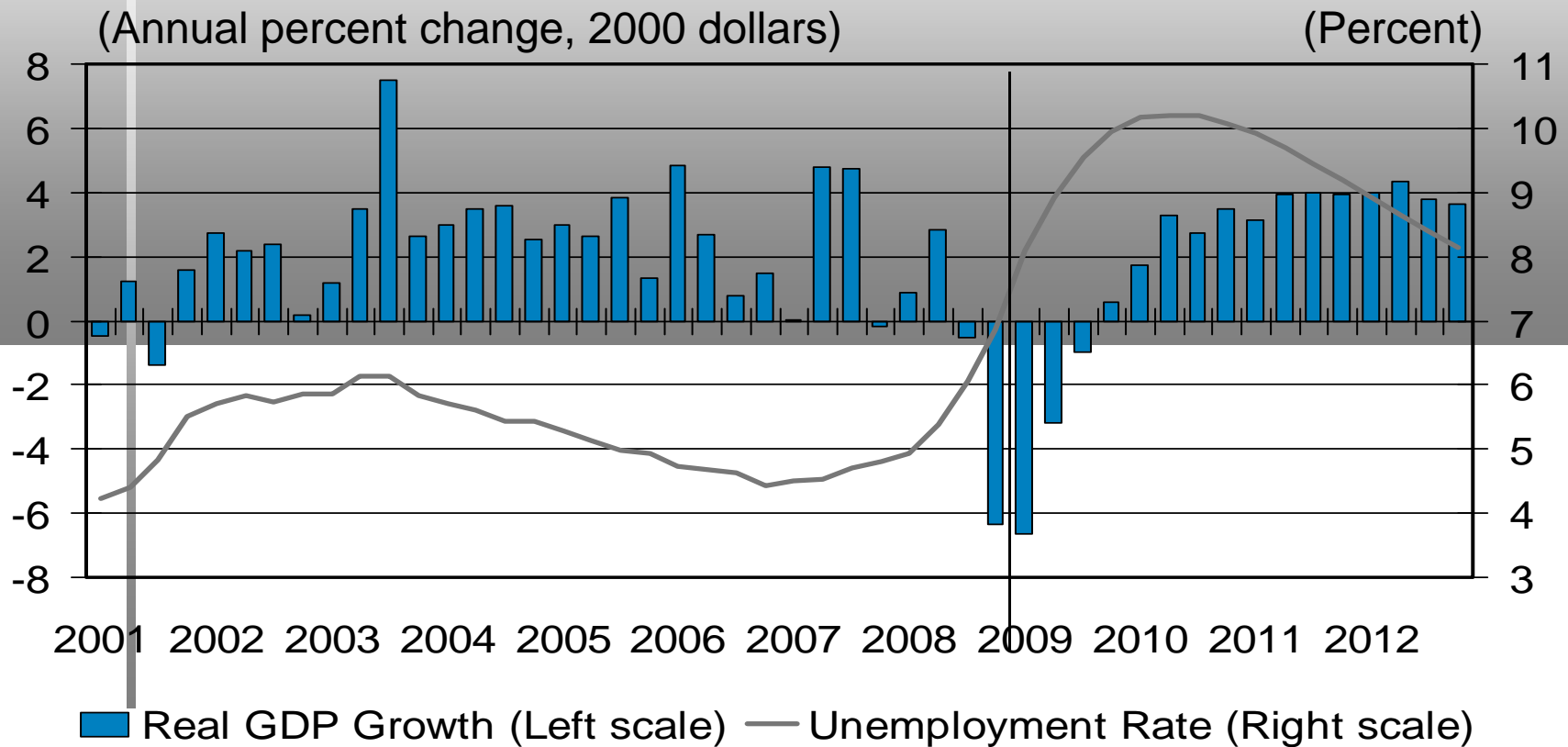


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Real GDP Growth and the Unemployment Rate



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U.S. Economic Growth by Sector

(Percent change)

| | 2008 | 2009 | 2010 | 2011 |
|------------------------|-------|-------|------|------|
| Real GDP | 1.1 | -3.5 | 1.4 | 3.5 |
| Consumption | 0.2 | -0.9 | 1.7 | 2.4 |
| Residential Investment | -21.0 | -24.6 | 9.6 | 28.7 |
| Bus. Fixed Investment | 1.6 | -18.8 | -0.1 | 13.2 |
| Federal Government | 6.0 | 5.2 | 1.2 | -3.7 |
| State & Local Govt. | 1.1 | -1.9 | -0.5 | -0.8 |
| Exports | 6.2 | -15.3 | -0.1 | 9.2 |
| Imports | -3.5 | -13.8 | 5.8 | 7.7 |



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Oil Market Outlook

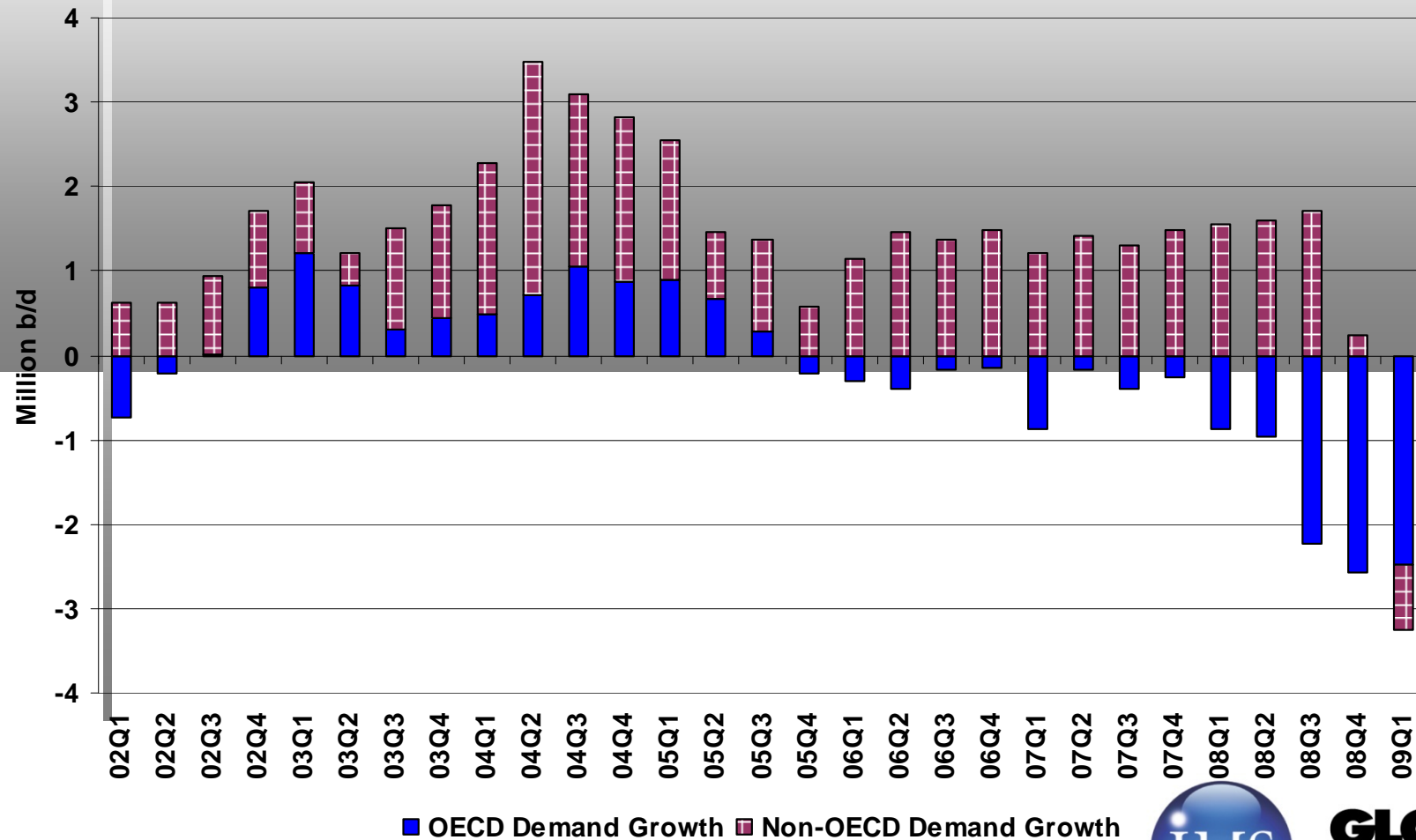
Energy Subsidies Exceed \$300 Billion World Wide



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Non-OECD Countries Have Driven Recent Growth in Oil Demand



■ OECD Demand Growth ■ Non-OECD Demand Growth

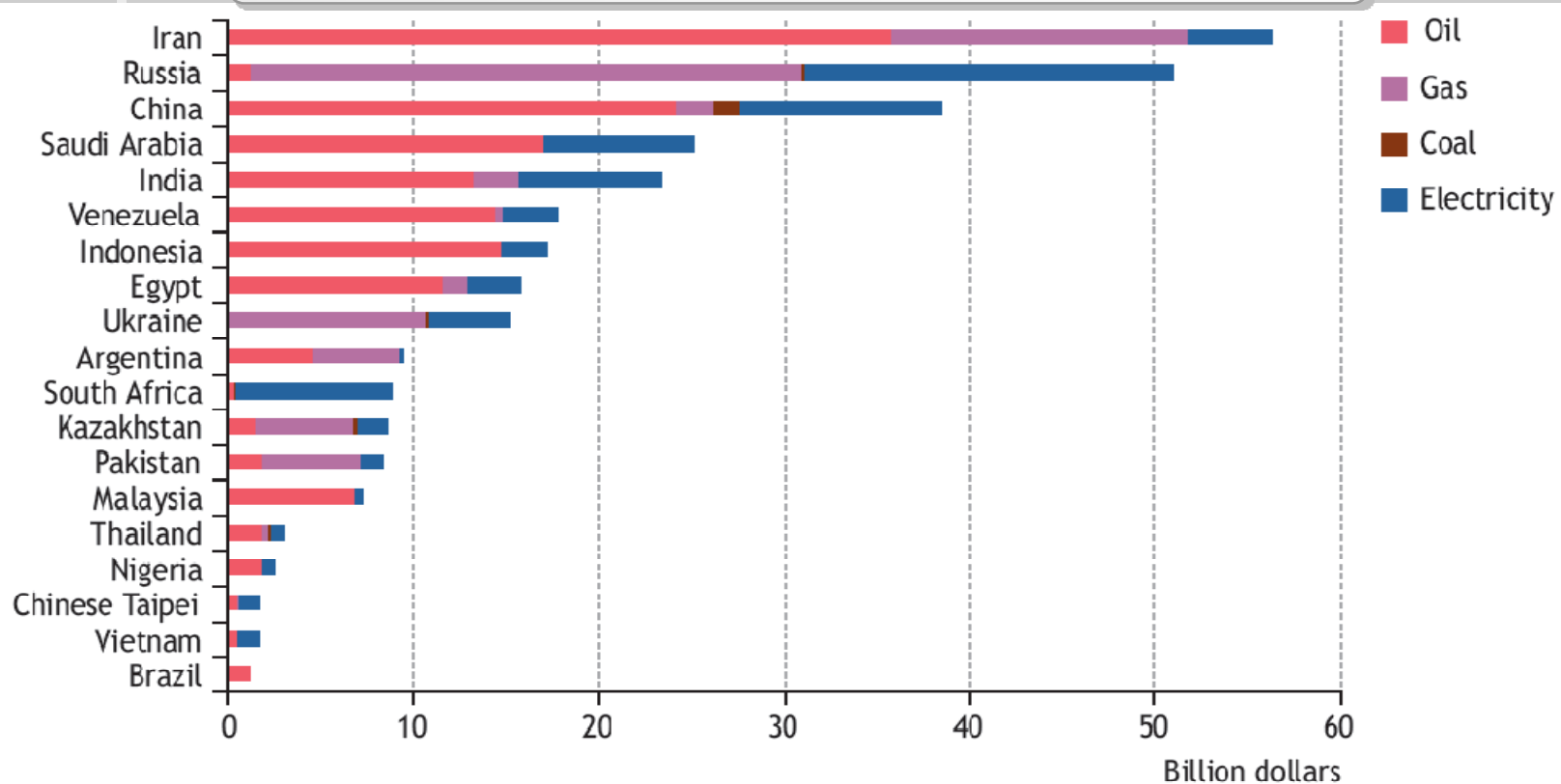


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Consumers in Key Markets Were Insulated Against Price Rises

Energy subsidies in non-OECD countries



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Natural Gas Outlook



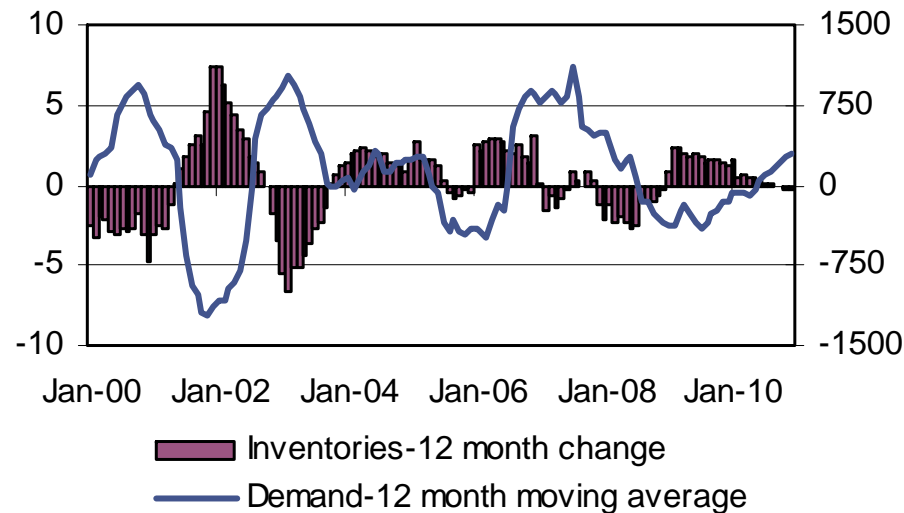
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Demand Fall Leads to Inventory Increase

- Inventory change lags demand

Inventories Follow Demand

(percent change(LHS),billion cubic feet(RHS))

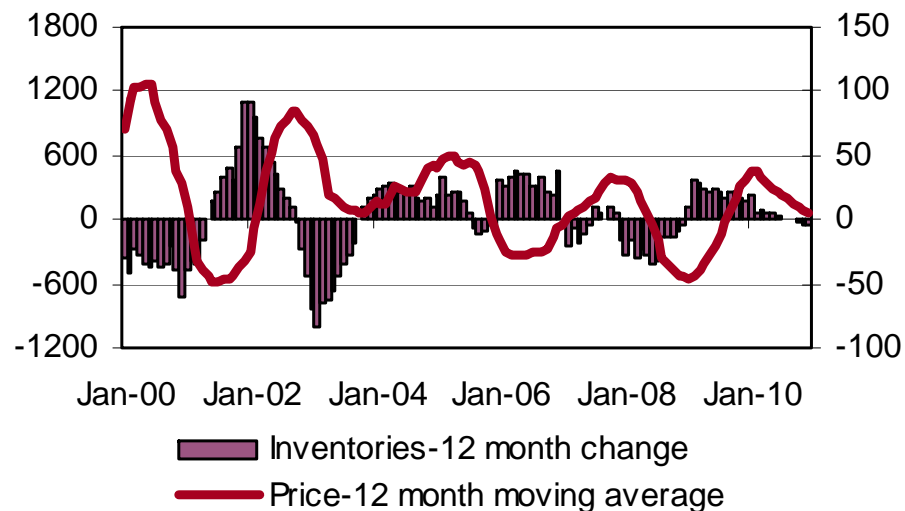


Demand Fall Leads to Inventory Increase and Inventory Increase Leads to Price Decline

- Price change lags demand and inventories

Price Follows Inventories

(Billion cubic feet(LHS), percent change(RHS))



Falling Demand, Falling Prices

Recession Upsets Natural Gas Balance

| | 2008 | 2009 | Change |
|---------------------------------------|-------|-------|---------------|
| Price(dollars per million Btu) | | | |
| Henry Hub | 9.03 | 3.85 | -57% |
| Rig Count | | | |
| | 1488 | 700 | -53% |
| Volumes(Billion Cubic Feet) | | | |
| Demand | 23260 | 22520 | -3.20% |
| Production | 20560 | 20210 | -1.70% |
| Inventories | | | |
| End March | 1244 | 1656 | 37% |
| End October | 3393 | 3836 | 11% |
| Summer Fill | 2149 | 2180 | 1% |
| LNG Imports | 351 | 670 | 90% |



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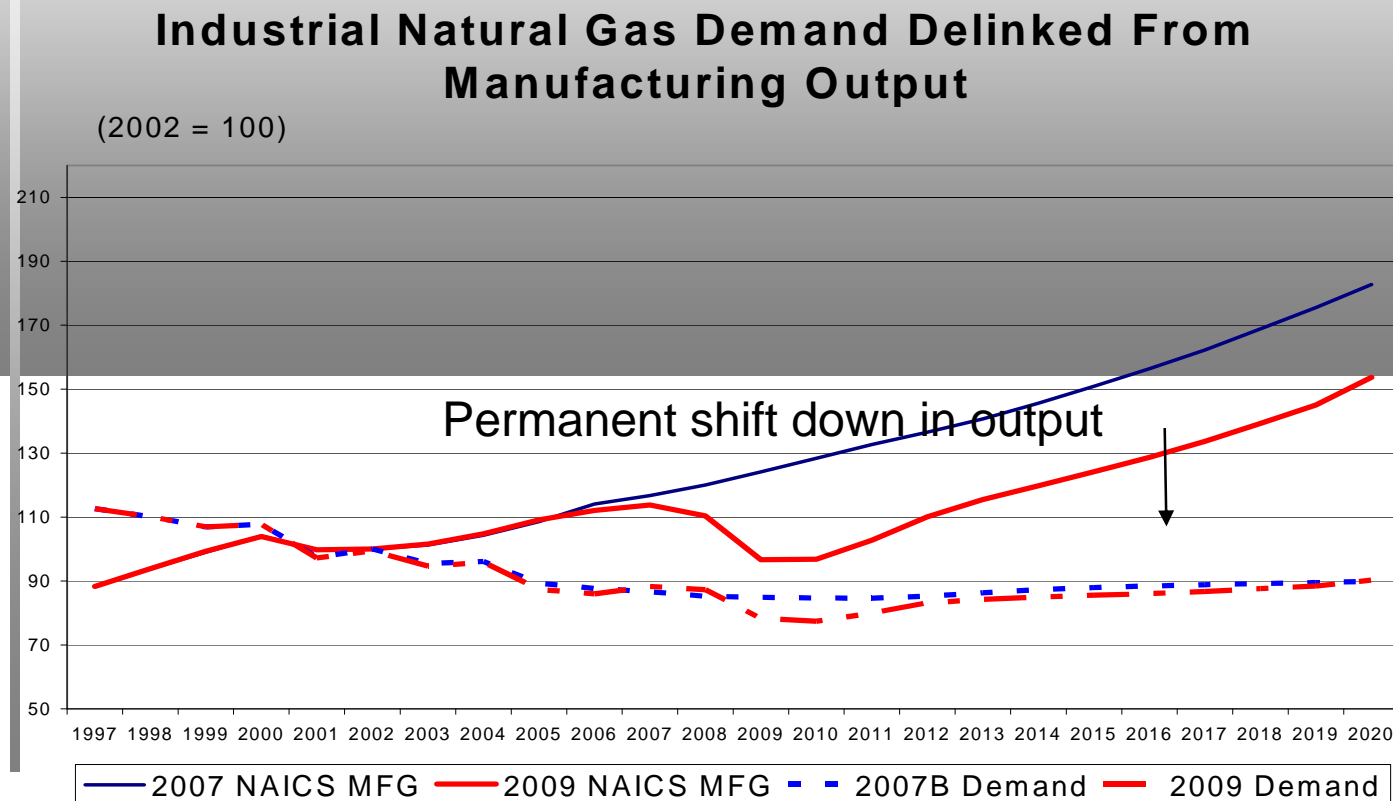
Bottom Line

- Demand began declining mid 2008, but production just starting to decline
- Inventories are hugely above year-ago levels and five-year averages
- Demand may decline further in 2009
- Prices reacting to weak economy, weak demand and high inventories
- Rig count crashing too late to balance market this summer
- Drilling slump may lead to production decline in 2010 and 2011, just when demand recovers



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Longer term, natural gas demand is not expected to return to previously forecast levels.



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Thank you

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